

$$\log_5 2 = x$$

HW: 5.6 / 1-49 (count by 4s) and also do #23

$$1) 8^x = 2^{x+1}$$

$$\textcircled{1} \log 8^x = \log 2^{x+1} \Leftrightarrow x \log 8 = (x+1) \log 2$$

$$x \log 8 = x \log 2 + \log 2$$

$$x(\log 8 - \log 2) = \log 2$$

$$x = \frac{\log 2}{\log 8 - \log 2}$$

$$2) 5^x = 2$$

$$\textcircled{2} (2^3)^x = 2^{(x+1)}$$

$$\log 5^x = \log 2 \Rightarrow 2^{3x} = 2^{x+1}$$

$$3) \log 2^{4x-1} = \log 3^{1-x}$$

$$(4 \log 2)x - \log 2 = \log 3 - x \log 3$$

$$x(4 \log 2 + \log 3) = \log 3 + \log 2$$

$$x = \frac{\log 3 + \log 2}{4 \log 2 + \log 3}$$

$$5) \ln(x-3) + \ln(2x+1) = 2 \ln(x)$$

$$\ln(x-3)(2x+1) = \ln x^2$$

$$(x-3)(2x+1) = x^2$$

$$2x^2 - 5x - 3 = x^2$$

$$x^2 - 5x - 3 = 0$$

$$6) \ln(x-3) = 5 - \ln(x-3)$$

$$7) \log(x-16) = 2 - \log(x-1)$$

$$\log(x-16) + \log(x-1) = 2$$

$$\log(x-16)(x-1) = 2$$

$$4) e^x - e^{-x} = 4$$

$$(e^x)^2 - 1 = 4(e^x) \Rightarrow (e^x)^2 - 4(e^x) - 1 = 0$$

$$(4 \log 2)x - \log 2 = \log 3 - x \log 3$$

$$(4 \log 2)x + x \log 3 = \log 3 + \log 2$$

$$x(4 \log 2 + \log 3)$$

$$y^2 - 4y - 1 = 0$$

$$y = \frac{4 \pm \sqrt{16+4}}{2}$$

$$= 2 \pm \frac{1}{2}\sqrt{20}$$

$$= (2 \pm \sqrt{5})$$

Now !!

$$e^x = 2 \pm \sqrt{5}$$

$$e^x = 2 + \sqrt{5} \quad | \quad e^x = 2 - \sqrt{5}$$

$$x = \ln(2 + \sqrt{5}) \quad | \quad \text{no sol}$$

